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**Popescu et al.**

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(54) **ADAPTER FOR INTERCONNECTING TWO WIRING DUCTS ON OPPOSITE SIDES OF A SUSPENDED CEILING**

(75) Inventors: **Dragos Popescu**, Rosny-Sous-Bois (FR); **Gary Bateson**, Mystic, CT (US)

(73) Assignee: **Planet Wattohm**, Senlis (FR)

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(52) **U.S. Cl.** ..... **174/70 R**; 174/48; 174/72 A; 52/220.1
(58) **Field of Search** ..... 174/70 R, 48, 174/68.3, 72 A, 88 R; 52/126.2, 220.1, 220.6, 220.8; 439/210, 213

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*Primary Examiner*—Dean A. Reichard
*Assistant Examiner*—W. David Walkenhorst
(74) *Attorney, Agent, or Firm*—Browdy and Neimark, P.L.LC.

(57) **ABSTRACT**

An adapter for connecting two wiring ducts on respective opposite sides of a suspended ceiling includes a back portion which has an opening at one end and upstream of the reference plane for inserting a first wiring duct. The other wiring duct can be butt-jointed to its other end. A cover portion at least partly covers the back portion, which has a reference plane which in use is level with the lower face of the suspended ceiling. Applications include conveying electrical cables or conductors through a suspended ceiling.

**10 Claims, 2 Drawing Sheets**

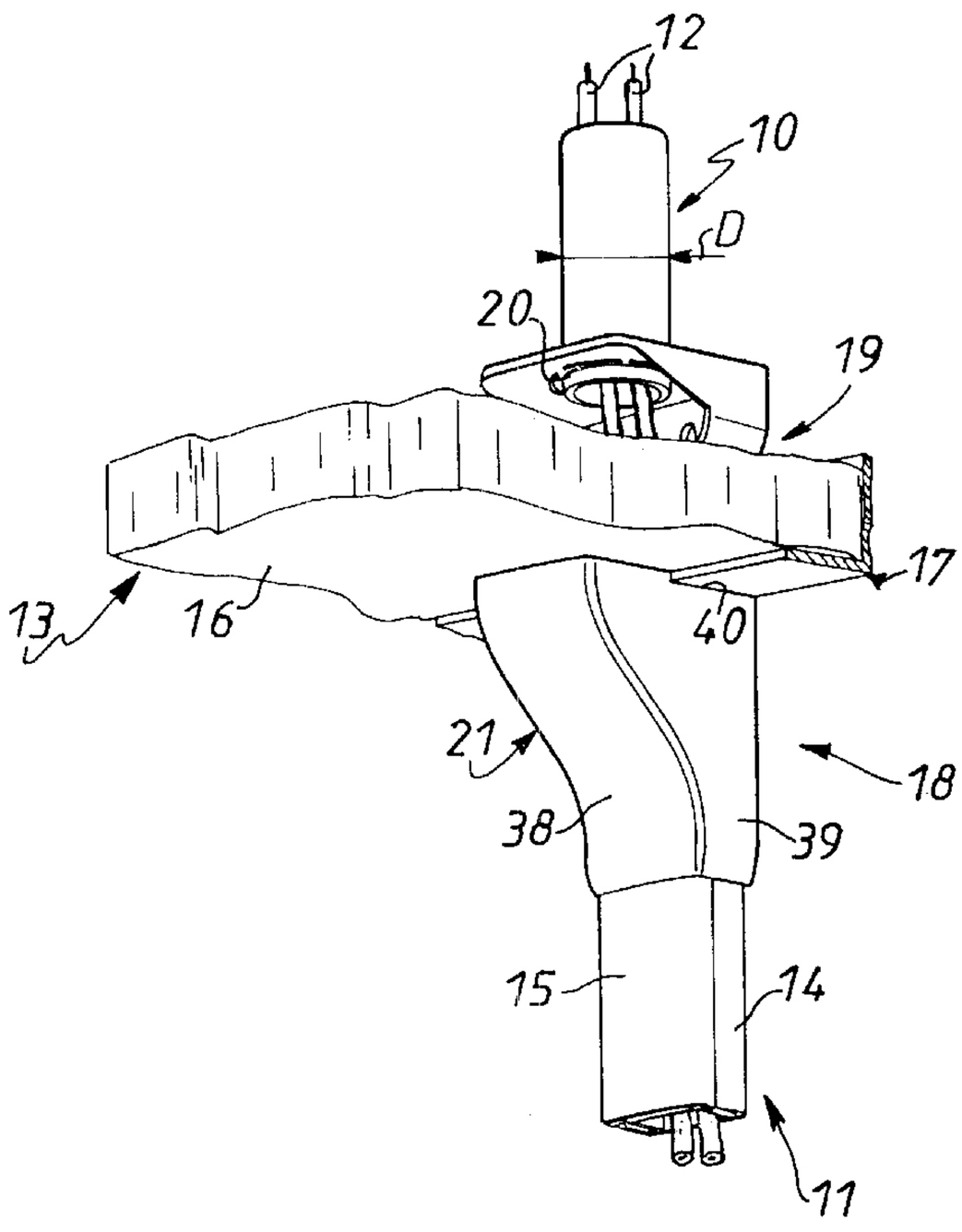

FIG. 1

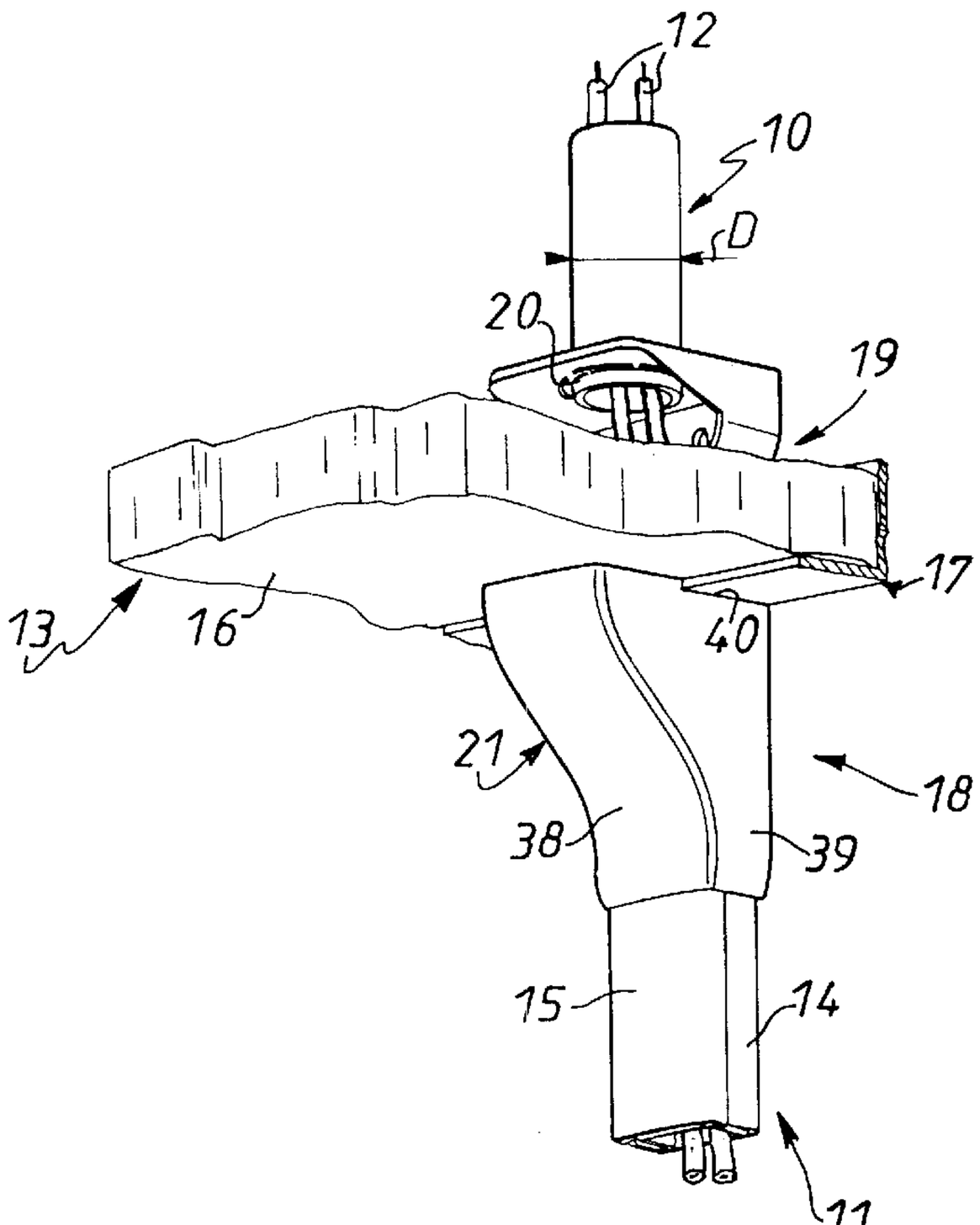
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FIG. 2

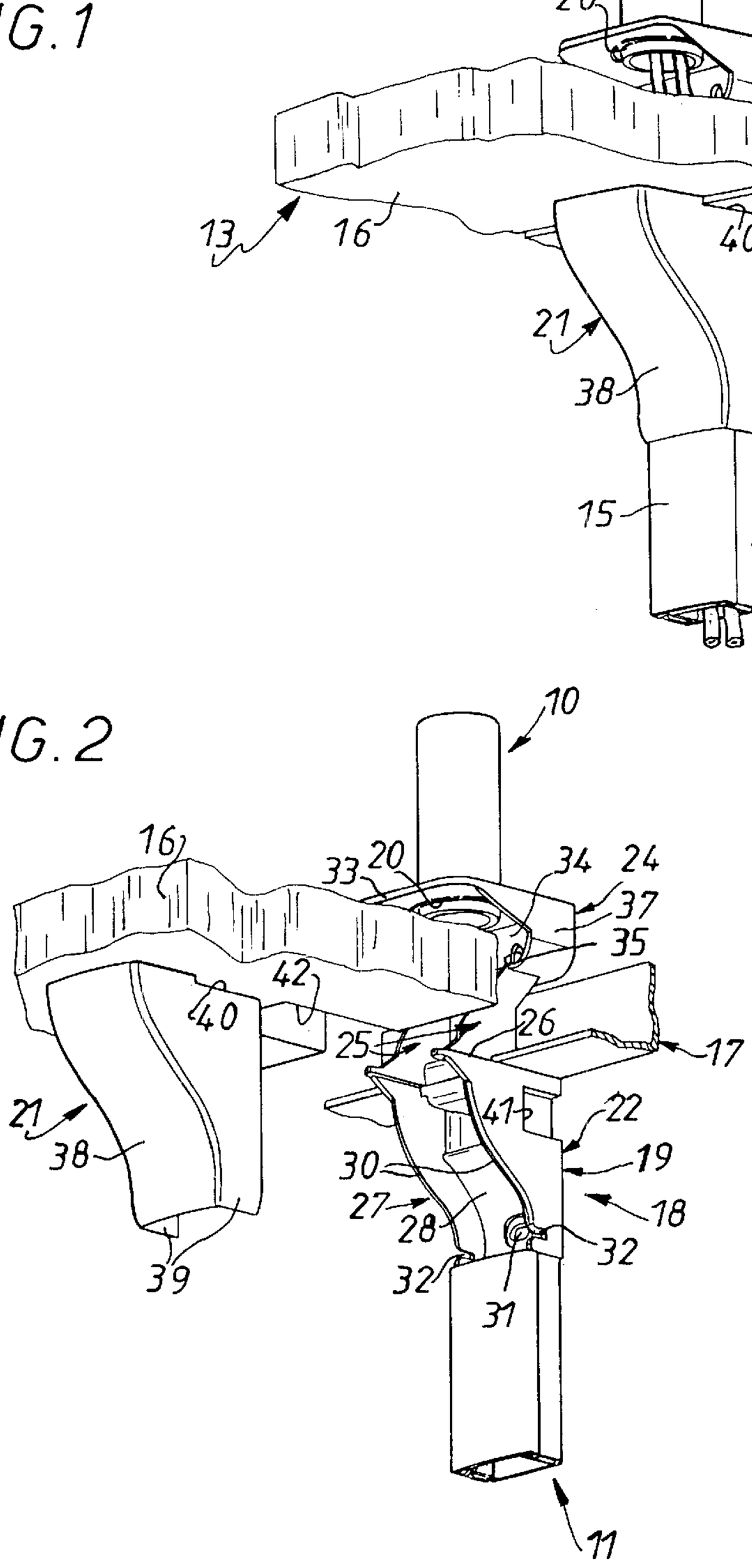
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FIG. 3

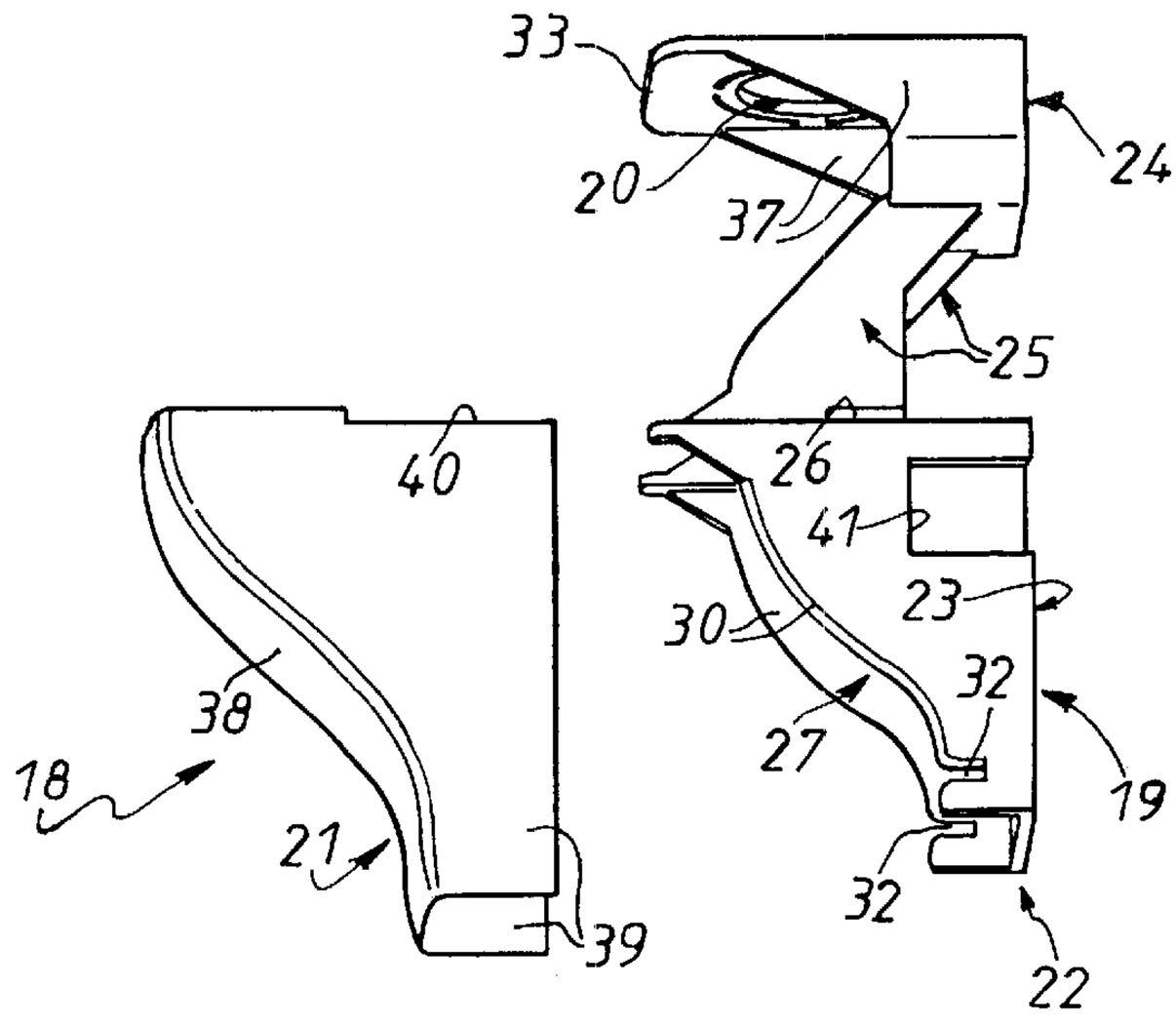
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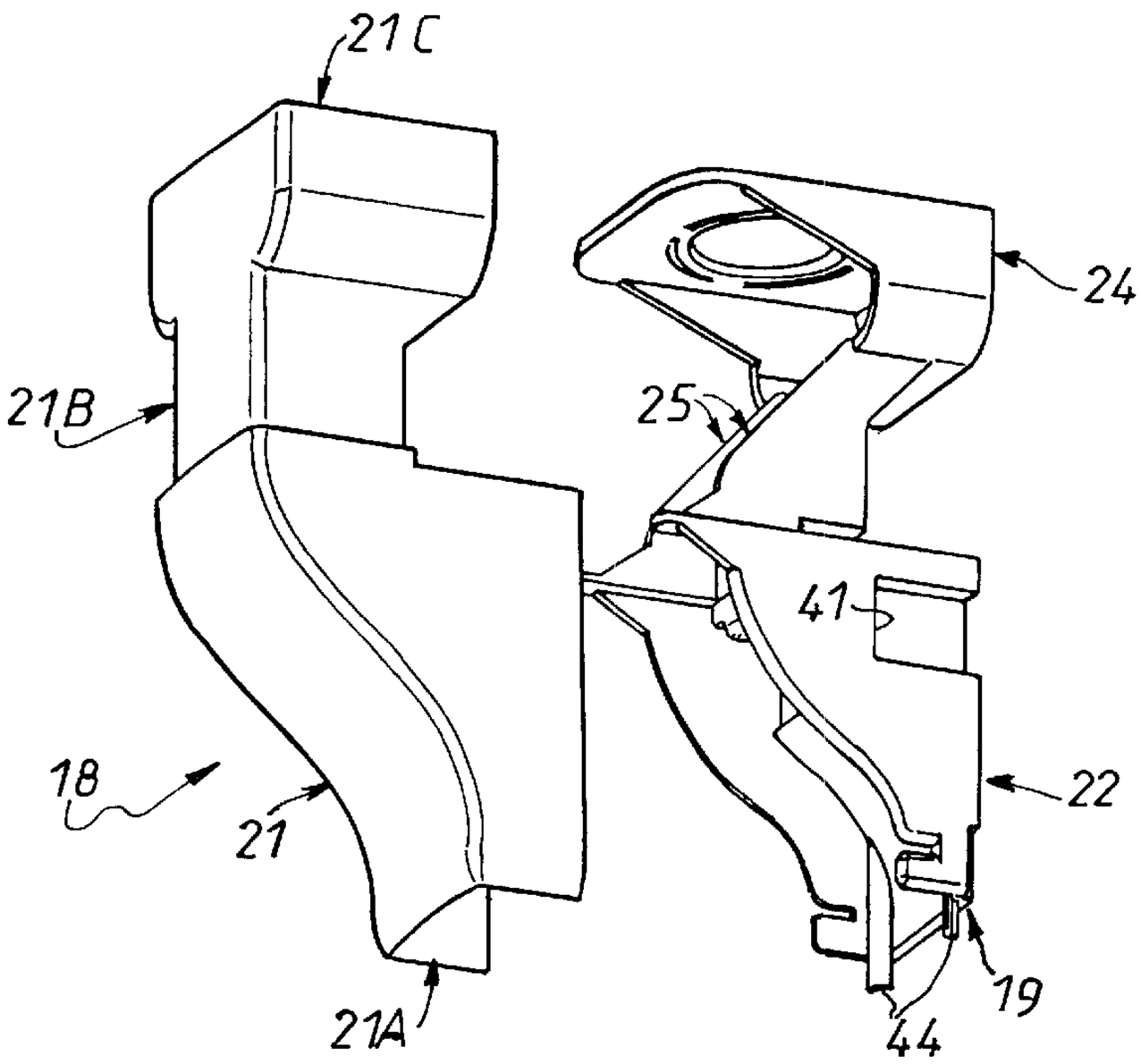
FIG. 4


21C
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# ADAPTER FOR INTERCONNECTING TWO WIRING DUCTS ON OPPOSITE SIDES OF A SUSPENDED CEILING

## BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to interconnecting two wiring ducts on opposite sides of a suspended ceiling.

2. Description of the Prior Art

The first duct is usually upstream of (i.e. above) the suspended ceiling and in the form of a tube located in the space above the suspended ceiling and containing the necessary electrical cables or conductors. The second duct is downstream of (i.e. below) the suspended ceiling, inside the room, and in the form of trunking, often referred to as a molding, designed to be installed against a wall of the room and taking over from the aforementioned tube as a means of routing the electrical cables or conductors.

In the usual way, the term "trunking" refers here to a wiring duct including, possibly in one piece, a base portion with an open cross section and a cover portion adapted to close the base portion.

The present invention is more precisely concerned with the connection to be made between the two wiring ducts for optimum continuity between them to protect and insulate the electrical cables or conductors.

The present invention relates more particularly to the situation in which this connection entails the use of an adapter including, on the one hand, a back portion which has an opening at one end into which a first of the wiring ducts is inserted and to the other end of which the other wiring duct can be butt-jointed, this back portion having a reference plane intended to be level with the lower face of the suspended ceiling and, on the other hand, a cover portion which at least partly covers the back portion.

At present the adapter is entirely below the reference plane, i.e. the suspended ceiling.

Consequently the wiring duct above the suspended ceiling has to pass through it, extending to a greater or lesser degree into the room below.

The diameter of the tube usually constituting this wiring duct varies from one installation to another. It follows that the adapter, which matches to the diameter of the tube, can be large compared to the duct inside the room, which is generally required to be of discreet appearance.

In some cases, for reasons of standardization, the back portion of the adapter must be adapted to receive the largest diameter tube.

In other words, at present it is the transverse dimension of the largest possible upstream wiring duct that imposes the size of the back portion of the adapter.

Accordingly, the adapter, all of which projects into the room, is relatively bulky, to the detriment of its esthetics, even though in some installations at least its dimensions may be larger than strictly necessary.

The object of the present invention is to provide an adapter which has the advantage of minimizing this disadvantage.

## SUMMARY OF THE INVENTION

According to the invention, the opening in the back portion of the adapter is upstream of the reference plane, and therefore of the suspended ceiling, so that the corresponding wiring duct does not need to pass through the suspended ceiling, or at least completely through it.



Accordingly, only the upstream part of the back portion must be suitable for the largest possible transverse dimension of the wiring duct and its downstream portion, which is the only portion that can be seen in the room, can be smaller and therefore more discreet, to the benefit of its esthetics.

Features and advantages of the invention will emerge from the following description which is given by way of example only and with reference to the accompanying diagrammatic drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of an adapter according to the invention, shown fitted through a suspended ceiling, together with the corresponding electrical cables or conductors.

FIG. **2** is an exploded perspective view of the adapter without the electrical cables or conductors.

FIG. **3** is an exploded perspective view of the adapter according to the invention shown in isolation.

FIG. **4** is an exploded perspective view of a different embodiment of the adapter according to the invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIGS. **1** and **2**, the object is to interconnect two wiring ducts **10**, **11** conveying electrical cables or conductors **12** and located on respective opposite sides of a suspended ceiling **13**, one on the upstream side of the suspended ceiling **13** and the other on its downstream side.

As shown here, for example, the wiring duct **10** upstream of the suspended ceiling **13** is a simple tube of diameter D which extends more or less freely above the suspended ceiling **13**.

The wiring duct **11** downstream of the suspended ceiling **13** is in the form of trunking, for example, as shown here, including in the usual way a base portion **14** adapted to be fixed against a wall, not shown, of the room below the suspended ceiling **13** and a cover portion **15** adapted to close the base portion **14**.

The suspended ceiling **13** is made up of tiles **16** which rest on the horizontal flange of angle-irons **17** which are continuous and fixed to the wall of the room. Hereinafter no distinction will be drawn between the ceiling and the tiles.

The foregoing arrangements are well known in the art and as they are not in themselves relevant to the present invention they are not described in more detail here.

As is also known in the art, interconnecting the two wiring ducts **10**, **11** entails the use of a dedicated accessory in the form of an adapter **18**.

The adapter **18** has a back portion **19** which has at one end, and as described in more detail later, an opening **20** into which is inserted a first of the wiring ducts **10**, **11**, here the wiring duct **10** upstream of the suspended ceiling **13**, and to the other end of which the other wiring duct **10**, **11** can be butt-jointed, here the wiring duct **11** downstream of the suspended ceiling **13**. It further includes a cover portion **21** which at least partly covers the back portion **19**, also as described in more detail later.

The opening **20** naturally has a diameter at least equal to the diameter D of the wiring duct **10**.

In practice, the back portion **19** incorporates a plurality of concentric potential openings **20**, only the innermost of

which is actually open, the others being pre-cut, and the outermost opening has a diameter matching the largest possible diameter of the wiring duct **10**.

The corresponding arrangements are also well known in the art, not relevant to the present invention and nou described in more detail here.

Furthermore, for simplicity, the following description is given as though the back portion **19** had only one opening **20**.

According to the invention, the opening **20** in the back portion **19** of the adapter **18** is upstream of a reference plane of the back portion (as defined below) which is intended to be level with the bottom face of the suspended ceiling, and is preferably at a sufficient distance from that plane to be upstream of the suspended ceiling **13** relative to the outside, i.e. relative to the room below.

In other words, the opening **20** is above the suspended ceiling **13**, in the void above it.

In the embodiments of the invention shown, the back portion **19** of the adapter **18** includes a base portion **22** below the reference plane and by means of which it can be attached to a wall, the base portions **22** consequently forming a substantially plane bearing surface **23**, a shelf **24** above the reference plane and which incorporates the opening **20**, and at least one connecting arm connecting the base portion **22** to the shelf **24**. This arm (or the set of arms if there is more than one) is no wider than the base portion.

As shown here, for example, there are two substantially parallel connecting members **25** which are spaced from each other and have identical configurations. Together they form a connecting arm.

In the embodiments shown, the connecting members **25** are in one piece with the base portion **22** and the shelf **24**, the entire back portion **19** being molded in one piece.

Over at least a part of their length between the base portion **22** and the shelf **24** each of the connecting members **25** is preferably set back from the bearing surface **23** of the base portion **22** in order to circumvent the horizontal flange (if locally present) of the corresponding angle-iron **17**. This offset advantageously runs from the base portion.

To be more precise, in the embodiments of the invention shown, each connecting arm **25** includes, where it joins onto the base portion **22**, a notch **26** in the edge nearest the bearing surface **23** of the base portion, by means of which it is adapted to be at least partly engaged over the flange in question of the angle-iron **17** concerned. This notch runs along the reference plane.

In practice, in the embodiment shown, the connecting members **25** are joined by a base portion so that together they form a U-shaped connecting arm which constitutes a channel insulating the wires, in particular from the angle-iron **17**. The members have an appropriate contour and extend in the manner of a bridge between the base portion **22** and the shelf **24**.

In the embodiments of the invention shown, the base portion **22** of the back portion **19** of the adapter **18** according to the invention forms a channel **27** with a back portion **28** and two side flanges **30** (see FIG. **2**) and the connecting arms **25** are each set back relative to the side flanges **30** of the channel **27**.

The reference plane is defined by the top edges of the side flanges **30** and/or the bottom edges of the members **25**.

As shown here, for example, the back portion **28** of the channel **27** is curved like a toboggan over at least part of its height, a plane portion at its end merging with the bearing surface **23**.

As shown here, the plane part of the back portion **28** is preferably locally perforated, including at least one hole **31** for fixing the base portion **22** to the wall against which it is placed.

There can of course be a plurality of holes **31** on the back portion **28**.

In the embodiments of the invention shown, at least one of the side flanges **30** of the channel **27** formed by the base portion **22** has at least one notch **32** for locating the cover portion **21** at the end farthest from the associated shelf **24**.

In practice, the sides flanges **30** of the channel **27** each have respective facing notches **32** of this kind.

The shelf **24** essentially comprises a flange **33** which has the opening **20** in it and which is substantially perpendicular to the bearing surface **23** of the base portion **22**, for example, and therefore substantially parallel to the suspended ceiling **13**.

In the embodiments of the invention shown, the shelf **24** further includes a baseplate **34** level with the bearing surface **23** of the base portion **22**, relative to which its flange **33** is cantilevered and through which it can also be placed in contact with the wall concerned.

As shown here, the baseplate **34** is preferably also locally perforated, including at least one hole **35** for fixing the shelf **24** to the wall.

There can be two holes **35** spaced by a distance parallel to the flange **33**, for example.

In the embodiments of the invention shown, the shelf **24** further includes two stiffening gussets **37** (which also protect the cables) which join its flange **33** to its baseplate **34** and have a profile which is at least locally curved.

As shown here, for example, the connecting arms **25** merge with the shelf **24** at the end of the gussets **37**, along the corresponding edge thereof.

In the embodiment more particularly shown in FIGS. **1** to **3**, the cover portion **21** comprises only one part, which is adapted to cover only the base portion **22** of the back portion **19**.

To be more precise, in this embodiment of the invention, the cover portion **21** is reduced to a front wall **38** whose profile follows that of the channel **27** formed by the base portion **22**, with two parallel upstanding rims **39** which are adapted to lie one on each side of the base portion **22** of the back portion **19**.

As shown here, the upstanding rims **39** preferably each have a step **40** in their edge nearest the shelf **24** so that they fit over the horizontal flange of the angle-iron **17** concerned.

Clipping means are preferably provided between the cover portion **21** and the base portion **22**.

In the embodiments of the invention shown, the clipping means are provided by recesses **41** on the outside surface of the side flanges **30** of the channel **27** formed by the base portion **22** and corresponding projections, which cannot be seen in the figures, on the inside surface of the side flanges **39** of the cover portion **21**.

The adapter **18** can be installed in the following manner, for example.

First, the tile **16** of the suspended ceiling **13** where the adapter **18** must be installed is freed from the angle-iron **17** concerned.

A notch **42** is then made in the tile **16** through which the connecting flanges **25** of the adapter **18** can pass. The cover portion **21** is preferably larger than the notch **42** to conceal the notch **42**. The smaller the notch, the smaller the cover portion.

The back portion **19** of the adapter **18** is then fixed to the wall concerned, possibly using the notch **26** in its connecting arms **25** to fit it over the horizontal flange of the angle-iron **17** and thereby locate it relative to the angle-iron **17** and consequently relative to the tile **16**, and/or possibly using the holes **31** or **35** to fix it to the wall.

The base portion **22** of the back portion **19** is therefore below the suspended ceiling **13** and its shelf **24** is above it.

The shelf **24** is then connected to the wiring duct **10** by inserting the latter into the corresponding opening **20** in the shelf **24**.

The base portion **14** of the wiring conduit **11** is then butt-jointed to the base portion **22** of the back portion **19**.

The electrical cables or conductors **12** are then routed from the wiring duct **10** to the wiring duct **11** via the back portion **19**.

The plate **16** is then fitted, engaging its notch **42** over the connecting arms **25** of the back portion **19**.

The wiring duct **11** is then closed and the cover portion **21** is finally attached to the base portion **22** of the back portion **19**.

As described above, the electrical cables or conductors **12** are protected by the cover portion **21** only below the suspended ceiling **13**.

In the embodiment of the invention shown in FIG. **4** they are protected continuously from the wiring duct **10** to the wiring duct **11**.

To this end, the cover portion **21** of the adapter **18** passes through the suspended ceiling **13** so that it covers all of the associated back portion **19**.

As shown in FIG. **4**, for example, the cover portion **21** then comprises three successive parts, namely a first end part **21**A which covers the base portion **22** of the back portion **19**, as previously, an intermediate part **21**B which covers the connecting arm(s) **25** of the back portion **19**, and a second end part **21**C which covers the shelf **24**.

In the embodiment of the invention shown, the intermediate part **21**B of the cover portion **21** is recessed relative to its end parts **21**A, **21**C.

Also, in this embodiment of the invention (although this is also valid in the previous case), projecting pins **44** are provided at the end of the base portion **22** of the back portion **19** opposite the shelf **24** to facilitate positioning the wiring duct **11** when installing the latter at the end of the back portion **19**.

Otherwise, the arrangements are as previously described.

Of course, the present invention is not limited to the embodiments described and shown, and encompasses any variant execution and/or combination of their various component parts.

The slots **26** and **40** associated with the presence of an angle-iron **17** (as often used) are not indispensable if the suspended ceiling does not use that type of support or if the angle-iron (or at least its horizontal flange) is locally interrupted.

Also, it has implicitly been assumed that the connecting arm (the U-shaped part or the set of flanges **25**), which is no wider than the base portion, has a length greater than the thickness of the suspended ceiling. This is not necessary, however, since if the arm is shorter than this thickness, all that is required is to form a cavity on the top of the suspended ceiling to receive the shelf and thus to obtain the advantage of the invention, which is to have a notch **42** in the suspended ceiling which, at least in the vicinity of its bottom surface, is not significantly wider than the base portion, and advantageously narrower than the shelf.

What is claimed is:

**1**. An adapter for connecting two wiring ducts on respective opposite sides of a suspended ceiling, said adapter comprising: a back portion having a reference plane adapted to be level with a lower face of the suspended ceiling, said back portion having two ends and having an opening at one of said ends, above said reference plane, for inserting a first one of the wiring ducts, and said back portion being adapted to have the other one of the wiring ducts butt-jointed to the other one of said ends below said reference plane; and a cover portion which at least partly covers said back portion, wherein said back portion comprises: a base portion below said reference plane, said base portion being adapted to be placed against a wall and defining a substantially planar bearing surface; a shelf above said reference plane which incorporates said opening; and at least one connecting arm no wider than said base portion and connecting said base portion to said shelf.

**2**. The adaptor claimed in claim **1** wherein said at least one connecting arm is set back relative to said bearing surface of said base portion over at least part of its length.

**3**. The adaptor claimed in claim **2** wherein said at least one connecting arm is set back over at least part of its length relative to said bearing surface of said base portion and starting therefrom.

**4**. The adaptor claimed in claim **1** wherein said at least one connecting arm has a notch recessed into its edge closest to said bearing surface of said base portion where it joins onto said base portion in said reference plane.

**5**. The adaptor claimed in claim **1** wherein said at least one connecting arm includes two substantially parallel members optionally linked by a back portion.

**6**. The adaptor claimed in claim **5** wherein said base portion forms a channel and said connecting arm members are set back relative to side flanges of said channel.

**7**. The adaptor claimed in claim **1** wherein said base portion forms a channel and at least one side flange of said channel has at least one notch at its end farthest away from said shelf.

**8**. The adaptor claimed in claim **1** wherein said cover portion has three successive parts, namely a first end part covering said base portion of said back portion, an intermediate part covering said connecting arm of said back portion and a second end part covering said shelf.

**9**. The adaptor claimed in claim **8** wherein said intermediate part of said cover portion is recessed relative to its end parts.

**10**. The adaptor claimed in claim **1** wherein said cover portion extends to both sides of said reference plane and covers all of said back portion.

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